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Supporting Online Material for

Asymmetric Mating Interactions Drive Widespread Invasion and Displacement in a Whitefly

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This PDF file includes:

1. Materials and Methods

1.1 Molecular identification of whitefly biotypes

The study in Zhejiang involved the alien B biotype (GenBank accession no. AJ867555) and the indigenous ZHJ1 biotype (GenBank accession no. AJ867556) of *Bemisia tabaci* (*S1, S2*). The study in Queensland involved the alien B biotype (GenBank accession no. AF215989) and the indigenous AN biotype (GenBank accession no. DQ842042) of *B. tabaci* (*S2, S3*). Regular identification of whitefly biotypes was done by RAPD-PCR with primer H16 (*S2, S4*). RAPD-PCR profiles for all biotypes yield unambiguous profiles that were cross-checked using mitochondrial CO1 and ribosomal ITS1 DNA sequencing.

1.2 Field sampling

In Zhejiang, we conducted field sampling from 2004 to 2006 at seven locations, which differ in terms of frequency of transport activities (Fig. 1A). All samples were taken in autumn from September to October each year. At each location in each year, we took samples from three cotton plots that were 100-1000 meters away from each other, and we also took samples from a range of other plants. In each plot, sampling was conducted along a "Z" route on every second plant, and one *B. tabaci* adult was taken from each infested plant until at least 100 adults were collected. Adults in each sample were preserved in 95% ethanol and stored at -20°C. Fifty adults from each sample were sexed and their biotypes were identified by RAPD-PCR.

In Queensland, we conducted field sampling on *Sonchus oleraceus* from 1995 to 2005 at 34 locations (Fig. 1B). Ten plants, each >1 m apart were selected and the lowest three leaves infested with 4th instar nymphs of *B. tabaci* were collected. Leaves were caged individually, and adults were allowed to emerge and collected into 95% ethanol. A subset of 60 adults was then sexed and their individual biotype identified using RAPD-PCR.

1.3 Population experiments on caged plants in Zhejiang, China

Whitefly cultures and plants. Both B and ZHJ1 biotypes of *B. tabaci* were maintained in separate cultures on cotton *Gossypium hirsutum* L (Malvaceae) cv. "Zhe-Mian 1793" in climate chambers at 27 ± 1 °C, LD 14:10 h and 70 ± 10% relative humidity. The purity of each of the cultures was monitored every three to five generations by sampling 30 adults using RAPD-PCR. Cotton plants were cultivated singly in a potting mix (a mixture of peat moss, vermiculite, organic fertilizer, perlite in a 10:10:10:1 ratio) in 1.5 L pots and enclosed in whitefly-proof screen cages under natural lighting and ambient temperature in screen houses or in temperature-controlled glasshouses. All experimental treatments were started with plants at the five to seven fully expanded true leaf stage. Cotton has been shown to be a suitable host plant for both B and ZHJ1 biotypes (*S2*).

Culturing of experimental populations of B and ZHJ1 biotypes. To observe the changes in relative proportion as well as sex ratios of B and ZHJ1 biotypes when they occur on the same plant, the following three treatments of caged populations were conducted: (a) B+ZHJ1 (B and ZHJ1 biotypes mixed), six replicates; (b) B alone (B biotype alone), three replicates; and (c) ZHJ1 alone (ZHJ1 biotype alone), three replicates. The 12 replicates of the three treatments were conducted using 12 whitefly-proof, ventilated cages (55 cm × 55 cm × 55 cm), in one room at 26 ± 2 °C, 50-70% relative humidity, and a photoperiod of LD 14:10 h. Newly-emerged adults from the whitefly cultures were used to initiate the treatments. Two cotton plants were placed into each cage at the start of the treatments. In treatment "B+ZHJ1", the two plants in each replicate (cage) were inoculated with three females and three males of the B biotype and 20 females and 20 males of the ZHJ1 biotype; in treatment "B alone", the two plants in each replicate were inoculated with 23 females and 23 males of the B biotype; and in treatment "ZHJ1 alone", the two plants in each replicate were inoculated with 23 females and 23 males of the ZHJ1 biotype. The plants were fertilized with a culture solution once a week and watered as necessary.

Sampling of the experimental populations. Every 25 days (which is approximately the development duration of one generation), 100 whitefly adults were sampled randomly from each replicate of the three treatments and preserved in 95% ethanol for sex determination and biotyping (for treatments "B alone" and "ZHJ1 alone", only 10 adults from each replicate were examined by RAPD-PCR for their biotype identity). To avoid overcrowding of the population in each replicate, after each sampling of the adults the older plant of the two in each cage was cut and taken out with all the eggs and nymphs with it, and a new, clean plant was added. To monitor the population densities, the 4th leaf from the top of each of the cut plants was sampled to count the number of nymphs on 1 cm^2 leaf area of the leaf. Sampling was stopped after the 9th sampling when ZHJ1 was found to be completely displaced by the B biotype in treatment "B+ZHJ1".

1.4 Population experiments on caged plants in Queensland, Australia

Whitefly cultures and plants. Both B and AN biotypes of *B. tabaci* were maintained in separate cultures on painted spurge *Euphorbia cyathophora* Murray (Euphorbiaceae) in

separate screened glasshouse. The purity of each of the cultures was monitored using RAPD-PCR prior to the experiments. Spurge plants were cultivated singly in a commercial potting mix in 2 L pots in a screened house under shade cloth at ambient temperatures before they were transplanted into the field cages for experiments. Spurge has been shown to be a suitable host plant for both B and AN biotypes (*S5*).

Culturing of experimental populations of B and AN. To observe the changes in relative proportion as well as sex ratios of AN and B when they occur together on the same plant, the following treatments of caged populations were conducted: (a) AN alone (100 AN females); (b) B alone (10 females); (c) AN+B (100 AN females plus 10 B females). The experiment was set up in a field site at Brisbane in January 2003 using 6 cages each measuring 1 × 1 × 2 meter and covered with fine mesh screen. Two spurge plants at the 8 leaf stage on the main branch were planted in pots into each of the cages. Each treatment was replicated twice in two cages and the same numbers of males were placed into the cage with the females to initiate the cohorts. All adults were newly emerged. The plants were fertilized with the slow release fertilizer Osmocote and watered as required. The experiment was run for 105 days from 12 January to 26 April, 2003, during which the daily minimum temperatures were mostly around 20°C, and the maximum temperatures were mostly around 30°C, and mean daily relative humidity was mostly 50-70%. With these climatic conditions, the cage populations were estimated to have gone approximately five generations at the end of the experiment.

Sampling of the experimental populations. At the end of the experiment four leaves with 4th instar nymphs at the "red-eye stage" were sampled randomly from each plant in each replicate, a total of 8 leaves per cage. From each leaf a 1.5 cm diameter disk was excised and placed on damp filter paper in a Petri dish until the adults had emerged. Adults were counted and then preserved in 95% ethanol for sex determination and biotyping.

1.5 Mating behaviour and frequency of copulation on caged leaves of plants

We used the video recording system we developed earlier (*S6*) to observe the mating behaviour and copulation events of adults caged on leaves of plants. One female and one male adults of a given biotype were supplemented with various numbers of males of the same or a different biotype. In Zhejiang, we conducted five treatments for both B and ZHJ1 on cotton. In Queensland, we conducted three treatments for both B and AN on spurge. Newly-emerged whitefly adults of various intra- and inter-biotype combinations were caged on the lower surface of plant leaves, and their movement and behaviour were observed and recorded continuously for 72 h at 27 ± 2°C, LD 14:10 h (light 06:00-19:59, dark 20:00-05:59), and 70 ± 10% RH. The events of courtship and copulation, as well as behaviour of interactions and interference between individuals of the same or different biotypes, were determined by viewing the tapes on a television set or a computer screen.

The courtship and mating behaviour of *B. tabaci* has been described in detail previously (*S7, S8*). In this study we viewed the tapes and determined the following behavioural elements: (1) copulation – a successful copulation event between a male and female; (2) courtship – a male and a female positioned parallel to each other with their bodies in contact; (3) interference – an intruding male interfered with the courtship or copulation of a male and a

female; (4) successful interference without displacement – an event of interference resulted in immediate, early ending of courtship or copulation, but the intruding made did not replace the earlier male; and (5) successful interference leading to displacement – an event of interference resulted in replacement of the first male by the intruding male in courting. With the recording of these behavioural elements, we were also able to calculate the number of un-interrupted events of courtship, i.e., events of courtship that were not interfered and ended naturally. Un-interrupted events of courtship could lead to copulation or could end without copulation.

For treatments that each had only female and males of the same biotype where we did not need to distinguish individual males, the tapes were viewed on a television set. For treatments that each had a female and males of different biotypes where we need to distinguish individual males, the tapes were viewed on a computer installed with the Motic Images Advanced 3.2 system (Motic China Group Co., Ltd., Xiamen, China). With this images system, we were able to measure the lengths of images of a whitefly on the screen to the accuracy of 1 μm. As only males and females of the same biotype could copulate and the biotype identity of the female in a given replicate was known, the male that copulated was identified as the same biotype as that of the female. By comparing the body lengths between the males, we learnt the relative lengths of two males – usually the ZHJ1 males were 5-8% longer than B males, and the AN males were 5-10% shorter than the B males. We then used the relative lengths between the males to distinguish between them in recording the behaviour of each male in a replicate.

For the ten treatments with B and ZHJ1 (Z) biotypes in Zhejiang, we recorded the events of copulation of each replicate and then analysed behaviour of courtship and interference in the following six treatments: 1B♂+1B♀, 1B♂+1B♀+1B♂, 1B♂+1B♀+1Z♂, 1Z♂+1Z♀, 1Z♂+1Z♀+1Z♂, and 1Z♂+1Z♀+1B♂. For the six treatments with B and AN in Queensland, we we recorded the events of copulation of each replicate and then analyzed behaviour of courtships and interference in all the six treatments: 1B♂+1B♀, 1B♂+1B♀+1B♂, 1B♂+1B♀+1AN♂, 1AN♂+1AN♀, 1AN♂+1AN♀+1AN♂, and 1AN♂+1AN♀+1B♂.

One-way Analysis of Variance and Fisher protected least significance tests were applied to reveal significant differences between mean values of different treatments, and proportion data were transformed by arcsine square root before subjected to analysis.

1.6 Fecundity and sex ratio on caged leaves of plants

In parallel with the observations on copulation events at both Zhejiang and Queensland, we examined the progeny production by a female of a given biotype when she was placed on a caged leaf of a plant with various numbers of males of the same and/or a different biotype. Newly-emerged whitefly adults of various intra- and inter-biotype combinations were caged on the lower surface of plant leaves, and left to mate and oviposit for five days before being discarded. All eggs laid on the plants were reared to adulthood. About 25-28 days later, all F1 adults were collected and sexed. In treatments where a pair (one female and one male) of adults of a given biotype were supplemented with males of another biotype, 10 F1 females were sampled from the progeny of each replicate to examine their identity using RAPD-PCR.

1.7 Influence of male availability on sex ratio of progeny

We made the observations with B and ZHJ1 biotypes on cotton plants. For either B or ZHJ1 biotype, three treatments, and 10 replicates of each treatment, were conducted. In treatment "Female + male throughout", one female adult was accompanied by one male adult throughout days 1-18 after emergence; in treatment "Female + male periodic", one female adult was accompanied by one male adult for three days after emergence, deprived of males for days 4-12, and then accompanied by one male adult again for days 13-18; and in treatment "Female + male for three days", one female adult was accompanied by one male adult for three days after emergence and was then deprived of males for days 4-18. Newly-emerged adults were obtained from the whitefly culture reared on cotton to start each of the three treatments on cotton. In each replicate, one female and one male adult were placed on the lower surface of a plant leaf (third to fifth leaf from the top) and enclosed in a clip-cage. Every three days, the adults were transferred to new leaves until the 18th day after emergence when all adults were discarded. All eggs laid by each female during each period of three days were reared to adult emergence, and the adults were counted and sexed.

2. Supporting Text

2.1 Details of behavioural interactions between B and ZHJ1 biotypes

The behaviour elements recorded for Treatments 1B♂+1B♀, 1B♂+1B♀+1B♂, and 1B♂+1B♀+1Z♂ are presented in Table S2. The mean events of courtship between B♂ and B♀ differed significantly between the three treatments ($F_{2,77} = 43.77$, $P < 0.001$); the mean events of uninterrupted courtship between B♂ and B♀ also differed significantly between the three treatments ($F_{2,77} = 37.85$, $P < 0.001$). Moreover, the mean events of uninterrupted courtship between B♂ and B♀ per B♂ still differed significantly between the three treatments ($F_{2,77} = 15.75$, $P < 0.001$) when the number of uninterrupted courtship events in the treatment 1B♀+1B♂+1B♂ was divided by 2. The mean percentages of events of uninterrupted courtship leading to copulation between B♂ and B♀ differed significantly between the three treatments ($F_{2,77} = 51.56$, $P < 0.001$).

The behaviour elements recorded for Treatments 1Z♂+1Z♀, 1Z♂+1Z♀+1Z♂, and 1Z♂+1Z♀+1B♂ are presented in Table S3. The mean events of courtship between Z♂ and Z♀ differed significantly between the three treatments ($F_{2,62} = 18.96$, $P < 0.001$); the mean events of uninterrupted courtship between Z♂ and Z♀ also differed significantly between the three treatments ($F_{2,62} = 20.16$, $P < 0.001$). However, the mean events of uninterrupted courtship between Z♂ and Z♀ per Z♂ did not differ significantly ($F_{2,62} = 2.58$, $P = 0.084$) between the three treatments when the number of uninterrupted courtship events in the treatment 1Z♀+1Z♂+1Z♂ was divided by 2. The mean percentages of uninterrupted courtship leading to copulation between Z♂ and Z♀ differed significantly between the three treatments ($F_{2,62} = 6.55$, $P = 0.003$).

2.2 Details of behavioural interactions between B and AN biotypes

The behaviour elements recorded for Treatments 1B♂+1B♀, 1B♂+1B♀+1B♂, and 1B♂+1B♀+1AN♂ are presented in Table S4. The mean events of courtship between B♂ and B♀ differed significantly between the three treatments ($F_{2,42} = 23.93$, $P < 0.001$); the mean

events of uninterrupted courtship between B♂ and B♀ also differed significantly between the three treatments ($F_{2,42} = 20.74$, $P < 0.001$). Moreover, the mean events of uninterrupted courtship between B♂ and B♀ per B♂ still differed significantly between the three treatments ($F_{2,42} = 10.95$, $P < 0.001$) when the number of uninterrupted courtship events in the treatment 1B♀+1B♂+1B♂ was divided by 2. The mean percentages of events of uninterrupted courtship leading to copulation between B♂ and B♀ differed significantly between the three treatments ($F_{2,42} = 11.81$, $P < 0.001$).

The behaviour elements recorded for Treatments 1AN♂+1AN♀, 1AN♂+1AN♀+1AN♂, and 1AN♂+1AN♀+1B♂ are presented in Table S5. The mean events of courtship between AN♂ and AN♀ differed significantly between the three treatments ($F_{2,57} = 34.59$, $P < 0.001$); the mean events of uninterrupted courtship between AN♂ and AN♀ also differed significantly between the three treatments ($F_{2,57} = 32.36$, $P < 0.001$). However, the mean events of uninterrupted courtship between AN♂ and AN♀ per AN♂ did not differ significantly between the three treatments ($F_{2,57} = 0.87$, $P = 0.43$)when the number of uninterrupted courtship events in the treatment 1AN♀+1AN♂+1AN♂ was divided by 2. The mean percentages of uninterrupted courtship leading to copulation between AN♂ and AN♀ differed significantly between the three treatments ($F_{2,57} = 16.37$, $P < 0.001$).

3. Supporting Tables

Table S1. Changes of density and sex ratio of the B and AN biotypes of *Bemisia tabaci* in a mixed population of the two biotypes on spurge in field cages.

Cohorts at start[a]	Mean (±SEM) number of adults and % females at the 5th generation[b]			
	AN biotype		B biotype	
	No. adults/leaf	% females	No. adults/leaf	% females
AN alone (100 females)	100.5±3.7a	56.1±0.2a		
B alone (10 females)			13.3±1.3a	62.3±2.2a
AN + B (100 + 10 females)	4.3±0.5b	22.1±5.3b	13.0±0.7a	76.1±3.1b

[a]The same number of males were placed with the females in each treatment to initiate the cohorts.

[b]The two means at the same column followed by different letters differ significantly at $P<0.05$ level (Student-*t* test).

Table S2. Behavioural elements that caused changes in events of copulation in the B biotype when a pair of B biotype ♂×♀ was supplemented with one ♂ of the B or ZHJ1 (Z) biotype. Behavioural events were recorded for 72 h after emergence. The data in the table are mean ± SEM, and means on the same line followed by different letters indicate significant differences.

Behavioural elements	Treatments		
	1B♂+1B♀	**1B♂+1B♀+1B♂**	**1B♂+1B♀+1Z♂**
1. No. of replicates	30	25	25
2. No. of copulation events	6.1 ± 0.5 b	9.3 ± 0.8 a	8.9 ± 0.8 a
3. Courtship events between B ♂ and B ♀			
3.1 Total no. of events	8.4 ± 0.7 c	36.4 ± 3.0 a	21.0 ± 2.5 b
3.2 No. of uninterrupted events	8.4 ± 0.7 c	32.7 ± 2.7 a	20.4 ± 2.4 b
3.3 No. of uninterrupted events per B♂	8.4 ± 0.7 b	16.4 ± 1.3 a	20.4 ± 2.4 a
3.4 % of uninterrupted events leading to copulation	74.7 ± 2.1 a	29.1 ± 1.9 c	50.8 ± 4.0 b
4. No. of courtship events between B ♂ and B ♀ interfered by a second B ♂			
4.1 Total no. of interference events		6.0 ± 0.6	
4.2 No. of events of successful interference without displacement		3.3 ± 0.5	
4.3 No. of events of successful interference leading to displacement		0.4 ± 0.2	
4.4 % of successful interference		10.3 ± 0.8	
5. No. of courtship events between B♂ and B♀ interfered by Z ♂			
5.1 Total no. of interference events			1.5 ± 0.3
5.2 No. of events of successful interference without displacement			0.6 ± 0.2
5.3 No. of events of successful interference leading to displacement			0.0 ± 0.0
5.4 % of successful interference			3.0 ± 0.8
6. No. of courtship events between Z ♂ and B♀ interfered by B ♂			
6.1 Total no. of courtship events			4.6 ± 0.6
6.2 Total no. of interference events			2.1 ± 0.3
6.3 No. of events of successful interference without displacement			1.6 ± 0.2
6.4 No. of events of successful interference leading to displacement			0.6 ± 0.2
6.5 % of successful interference			49.9 ± 5.3

Table S3. Behavioural elements that caused changes in events of copulation in the ZHJ1 (Z) biotype when a pair of ZHJ1 biotype ♂×♀ was supplemented with one ♂ of the ZHJ1 or B biotype. Behavioural events were recorded for 72 h after emergence. The data in the table are mean ± SEM, and means on the same line followed by different letters indicate significant differences.

Behavioural elements	Treatments		
	1Z♂+1Z♀	**1Z♂+1Z♀+1Z♂**	**1Z♂+1Z♀+1B♂**
1. No. of replicates	25	21	19
2. No. of copulation events	3.9 ± 0.3 a	3.9 ± 0.5 a	2.1 ± 0.5 b
3. Courtship events between Z ♂ and Z ♀			
3.1 Total no. of events	9.8 ± 0.7 b	27.0 ± 3.9 a	9.6 ± 1.1 b
3.2 No. of uninterrupted events	9.8 ± 0.7 b	23.7 ± 3.1 a	8.2 ± 1.0 b
3.3 No. of uninterrupted events per Z ♂	9.8 ± 0.7 a	11.8 ± 1.6 a	8.2 ± 1.0 a
3.4 % of uninterrupted events leading to copulation	42.0 ± 2.8 a	19.6 ± 1.8 c	30.5 ± 6.3 b
4. No. of courtship events between Z ♂ and Z ♀ interfered by a second Z ♂			
4.1 Total no. of interference events		4.0 ± 1.0	
4.2 No. of events of successful interference without displacement		2.7 ± 0.7	
4.3 No. of events of successful interference leading to displacement		0.6 ± 0.3	
4.4 % of successful interference		8.5 ± 1.7	
5. No. of courtship events between Z ♂ and Z ♀ interfered by B ♂			
5.1 Total no. of interference events			1.9 ± 0.5
5.2 No. of events of successful interference without displacement			1.7 ± 0.4
5.3 No. of events of successful interference leading to displacement			0.1 ± 0.1
5.4 % of successful interference			15.9 ± 2.5
6. No. of courtship events between B ♂ and Z ♀ interfered by Z ♂			
6.1 Total no. of courtship events			15.9 ± 1.3
6.2 Total no. of interference events			0.6 ± 0.2
6.3 No. of events of successful interference without displacement			0.4 ± 0.1
6.4 No. of events of successful interference leading to displacement			0.0 ± 0.0
6.5 % of successful interference			2.1 ± 0.7

Table S4. Behavioural elements that caused changes in events of copulation in the B biotype when a pair of B biotype ♂×♀ was supplemented with one ♂ of the B or AN biotype. Behavioural events were recorded for 72 h after emergence. The data in the table are mean ± SEM, and means on the same line followed by different letters indicate significant differences.

Behavioural elements	Treatments		
	1B♂+1B♀	**1B♂+1B♀+1B♂**	**1B♂+1B♀+1AN♂**
1. No. of replicates	14	15	16
2. No. of copulation events	4.9 ± 0.6 b	8.2 ± 0.9 a	8.1± 1.3 a
3. Courtship events between B ♂ and B ♀			
3.1 Total no. of events	13.6 ± 1.8 b	57.6 ± 7.2 a	46.9 ± 2.8 a
3.2 No. of uninterrupted events	13.6 ± 1.8 c	53.1 ± 6.7 a	30.9 ± 2.7 b
3.3 No. of uninterrupted events per B♂	13.6 ± 1.8 b	26.6 ± 3.3 a	30.9 ± 2.7 a
3.4 % of uninterrupted events leading to copulation	42.6 ± 6.2 a	16.5 ± 1.5 c	25.0 ± 2.7 b
4. No. of courtship events between B ♂ and B ♀ interfered by a second B ♂			
4.1 Total no. of interference events		8.3 ± 1.2	
4.2 No. of events of successful interference without displacement		3.8 ± 1.0	
4.3 No. of events of successful interference leading to displacement		0.7 ± 0.2	
4.4 % of successful interference		16.5 ± 1.5	
5. No. of courtship events between B♂ and B♀ interfered by AN ♂			
5.1 Total no. of interference events			9.4 ± 1.3
5.2 No. of events of successful interference without displacement			5.2 ± 0.6
5.3 No. of events of successful interference leading to displacement			0.5 ± 0.2
5.4 % of successful interference			11.8 ± 1.2
6. No. of courtship events between AN ♂ and B♀ interfered by B ♂			
6.1 Total no. of courtship events			27.2 ± 2.4
6.2 Total no. of interference events			11.4 ± 1.4
6.3 No. of events of successful interference without displacement			8.4 ± 1.1
6.4 No. of events of successful interference leading to displacement			1.9 ± 0.3
6.5 % of successful interference			37.5 ± 2.6

Table S5. Behavioural elements related to changes in events of copulation in the AN biotype when a pair of AN biotype ♂×♀ was supplemented with one ♂ of the AN or B biotype. Behavioural events were recorded for 72 h after emergence. The data in the table are mean ± SEM, and means on the same line followed by different letters indicate significant differences.

Behavioural elements	**Treatments**		
	1AN♂+1AN♀	**1AN♂+1AN♀ +1AN♂**	**1AN♂+1AN♀ +1B♂**
1. No. of replicates	24	21	15
2. No. of copulation events	4.3 ± 0.3 ab	4.8 ± 0.5 a	3.2 ± 0.4 b
3. Courtship events between AN ♂ and AN ♀			
3.1 Total no. of events	15.6 ± 1.5 c	42.1 ± 3.3 a	23.7 ± 2.1 b
3.2 No. of uninterrupted events	15.6 ± 1.5 b	36.6 ± 2.7 a	17.3 ± 1.8 b
3.3 No. of uninterrupted events per AN ♂	15.6 ± 1.5 a	18.2 ± 1.3 a	17.3 ± 1.8 a
3.4 % of uninterrupted events leading to copulation	31.3 ± 2.8 a	14.0 ± 1.6 b	18.9 ± 1.9 b
4. No. of courtship events between AN ♂ and AN ♀ interfered by a second AN ♂			
4.1 Total no. of interference events		9.3 ± 1.2	
4.2 No. of events of successful interference without displacement		3.6 ± 0.7	
4.3 No. of events of successful interference leading to displacement		2.0 ± 0.3	
4.4 % of successful interference		12.9 ± 1.0	
5. No. of courtship events between AN ♂ and AN ♀ interfered by B ♂			
5.1 Total no. of interference events			8.1 ± 1.3
5.2 No. of events of successful interference without displacement			5.2 ± 0.5
5.3 No. of events of successful interference leading to displacement			1.2 ± 0.2
5.4 % of successful interference			28.1 ± 2.7
6. No. of courtship events between B ♂ and AN ♀ interfered by AN ♂			
6.1 Total no. of courtship events			21.8 ± 2.5
6.2 Total no. of interference events			6.2 ± 1.1
6.3 No. of events of successful interference without displacement			2.9 ± 0.5
6.4 No. of events of successful interference leading to displacement			0.2 ± 0.1
6.5 % of successful interference			14.9 ± 2.3

4. Supporting Figures

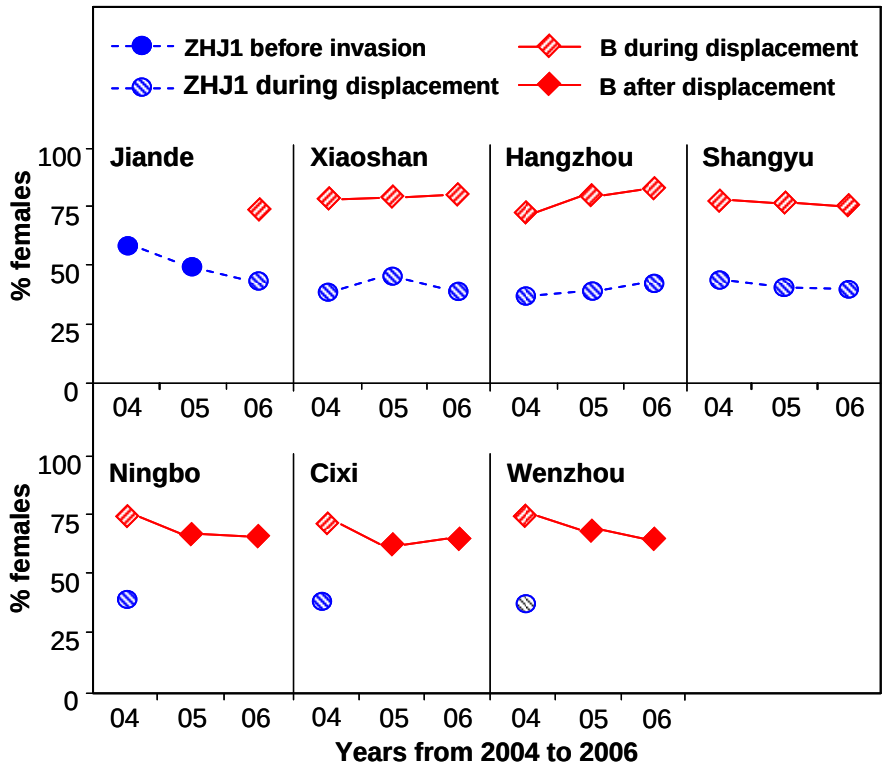

Fig. S1. Mean percentages of females in field populations of the ZHJ1 and B biotypes of *Bemisia tabaci* on cotton at seven locations in Zhejiang, China over the period from 2004 to 2006 before (ZHJ1 alone), during (B and ZHJ1 together), and after (B alone) invasion and displacement by the B biotype. For clarity, when populations of mixed biotypes as well as populations of pure biotypes occurred in a location in the same year, only the data of the populations of mixed biotypes are presented for that year.

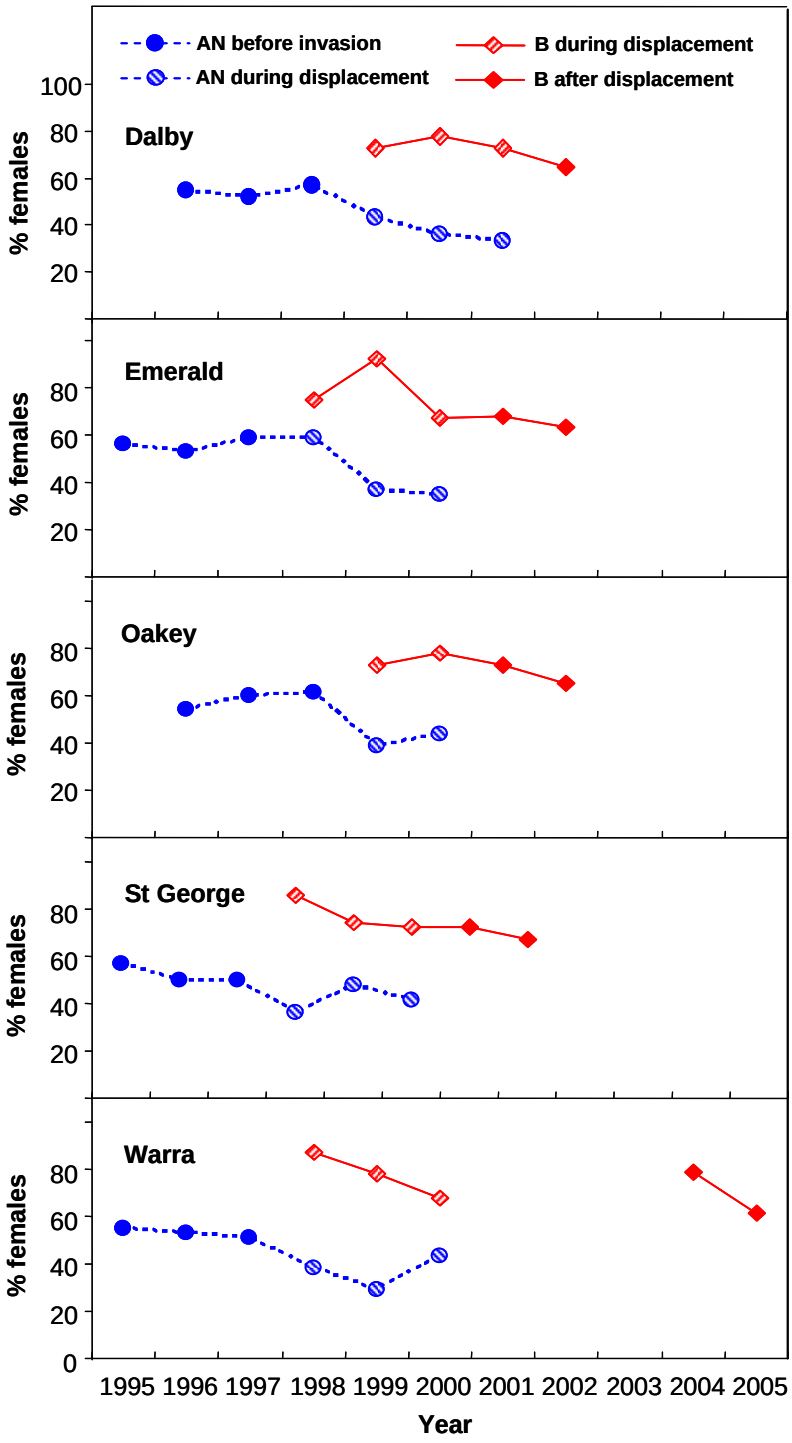

Fig. S2. Mean percentages of females in field populations of the AN and B biotypes of *Bemisia tabaci* on *Sonchus oleraceus* at five locations in Queensland, Australia over the period from 1995 to 2005 before (AN alone), during (AN and B together), and after (B alone) invasion and displacement by the B biotype. Data of other locations are not presented because of space.

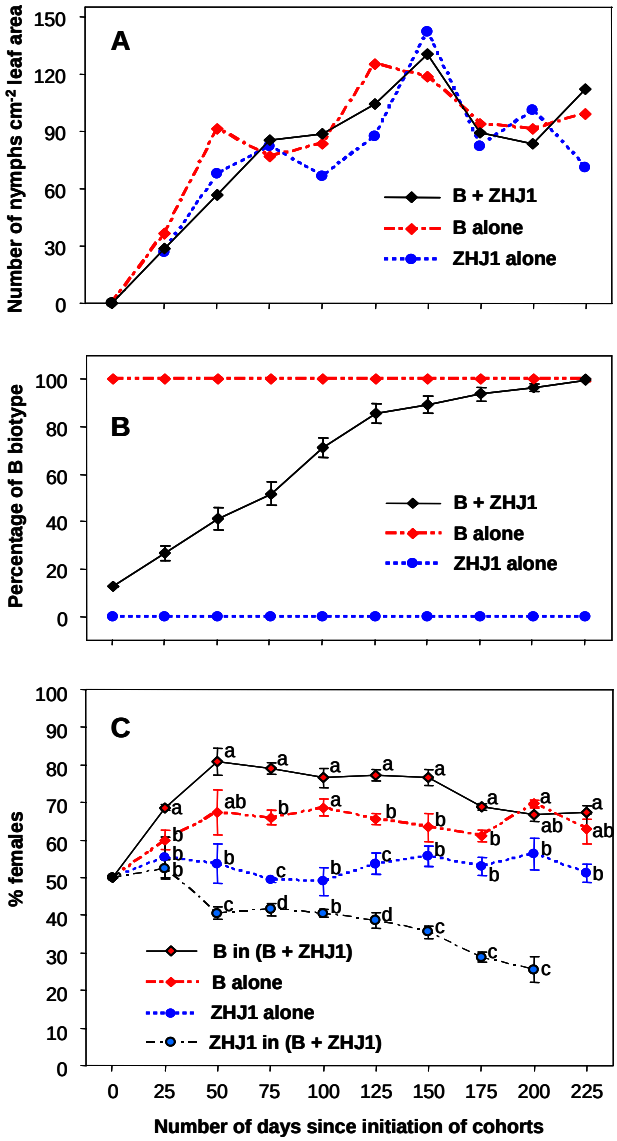

Fig. S3. Changes of relative proportions and sex ratios of the B and ZHJ1 biotypes in a mixed population of the two biotypes on cotton in the laboratory. A, mean number of whitefly nymphs cm^{-2} leaf area in cohorts of mixed biotypes of B + ZHJ1, cohorts of B alone, and cohorts of ZHJ1 alone, respectively; **B,** mean percentages of B biotype individuals in cohorts of mixed biotypes of B + ZHJ1, cohorts of B alone, and cohorts of ZHJ1 alone, respectively; **C,** mean percentages of females of the B biotype in the cohorts of mixed biotypes of B + ZHJ1, mean percentages of females in the cohorts of B biotype alone, mean percentages of females in the cohorts of ZHJ1 biotype alone, and mean percentages of females of the ZHJ1 biotype in the cohorts of mixed biotypes of B + ZHJ1, respectively. In Figure **c**, different letters to the right of the four mean values on the same day indicate significant differences (One-way ANOVA and Fisher protected least significant difference tests at $P < 0.05$, based on proportion data transformed by arcsine square root). Error bars indicate standard errors.

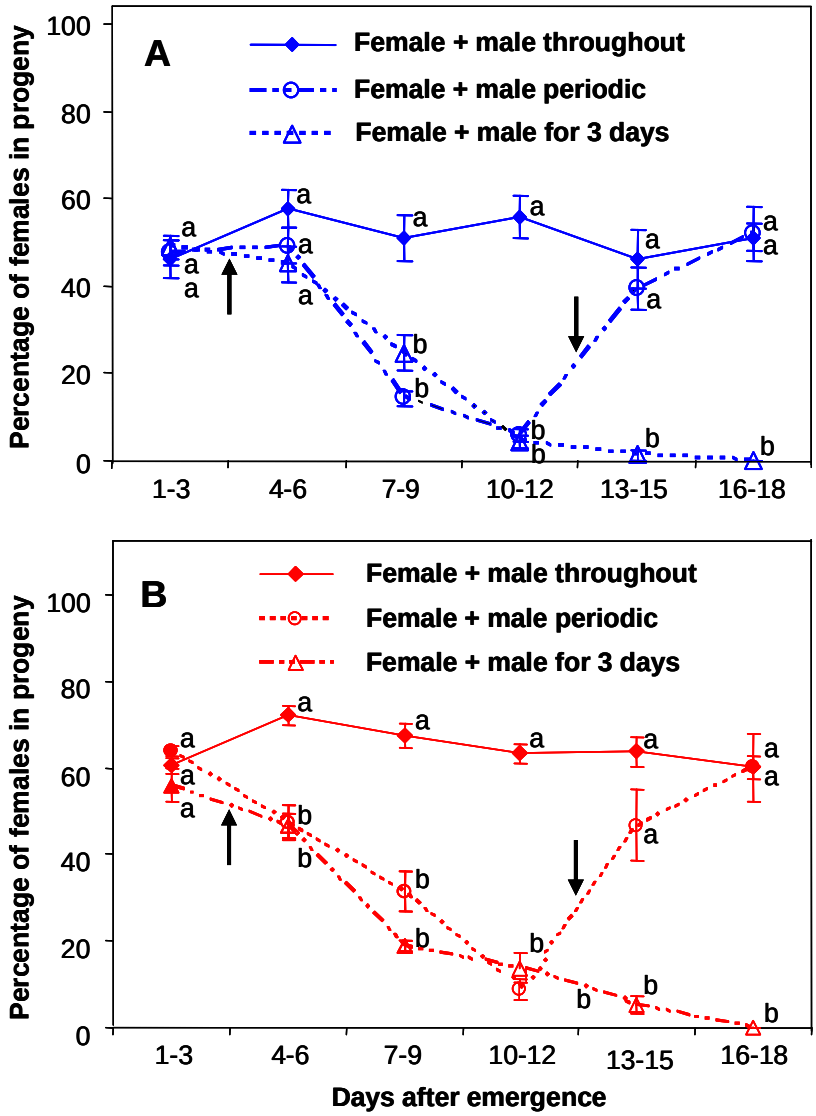

Fig. S4. Proportions of females in progeny produced by females with varying male availability in ZHJ1 (A) and B (B) biotypes. The up-pointed arrows in Figures **a** and **b** indicate the time when the male adults in the Treatments "female + male periodic" and "Female + male for 3 days" were removed, and the down-pointed arrows indicate the time when male adults are reintroduced to the females in the Treatment "female + male periodic". In Figures A or B, different letters to the right of the three mean values on the same days indicate significant differences (One-way ANOVA and Fisher protected least significant difference tests at $P < 0.05$, based on proportion data transformed by arcsine square root). Error bars indicate standard errors.

5. Supporting References and Notes

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